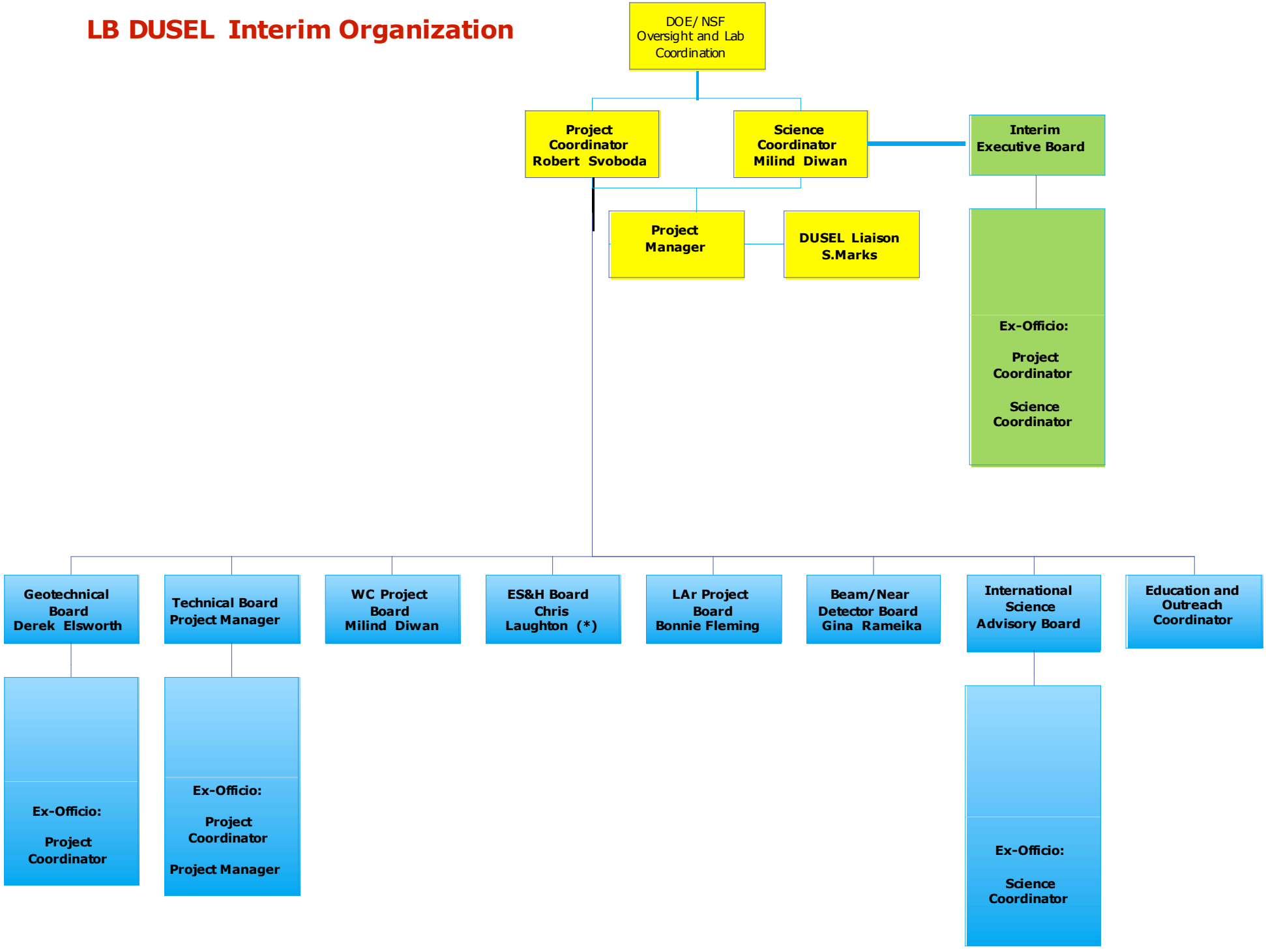
Large detector slides for Kevin Lesko

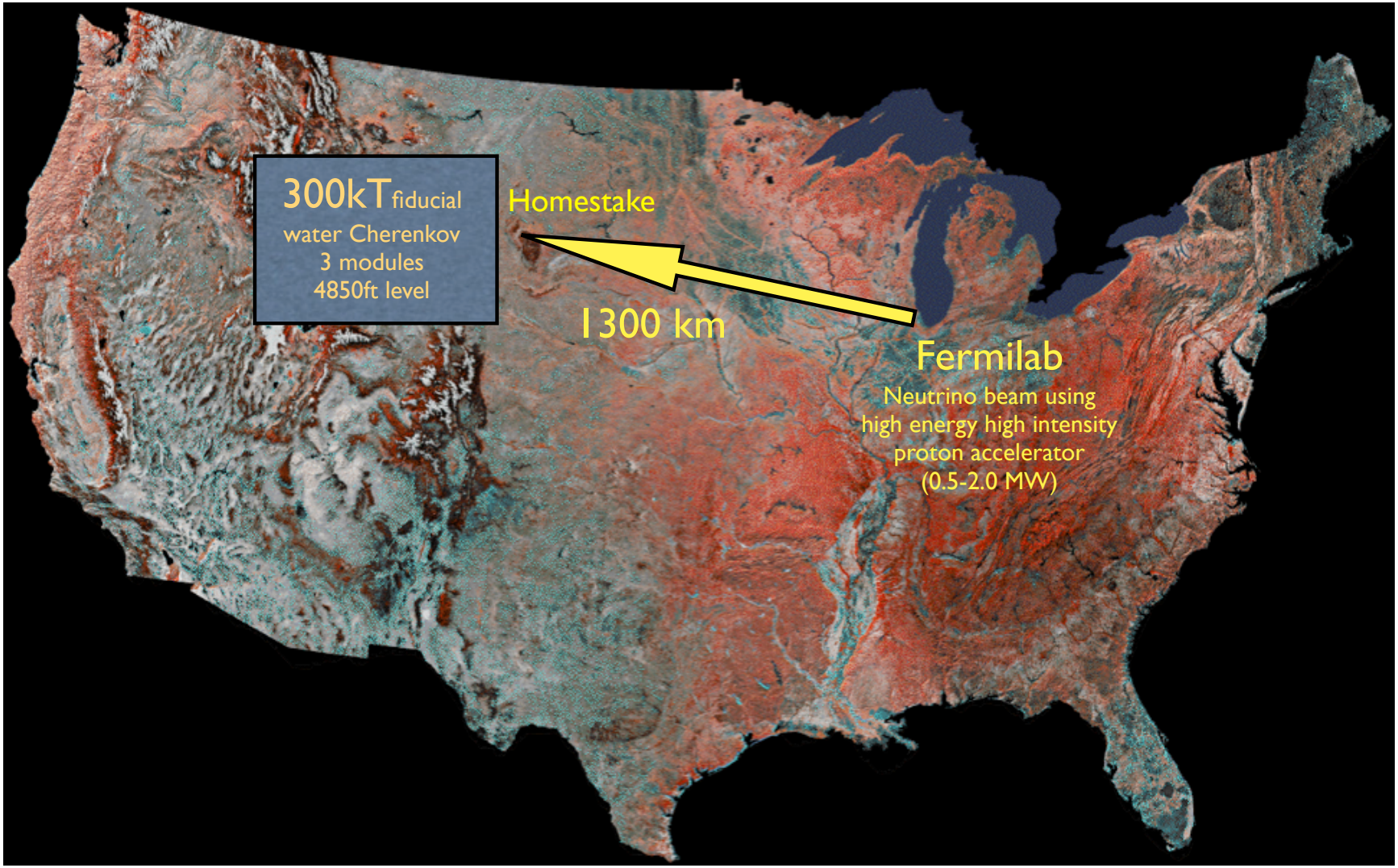
M. Diwan

Collaboration

- Interim collaboration structure in place.
- Key persons with experience from IMB, Superkamiokande, MINOS, SNO as well as other previous accelerator and detector projects.
- Membership from key institutions: UC/ Berkeley, BNL, UC/Davis, LBNL, Univ. Pennsylvania, Princeton, UCLA, Wisconsin, Kansas, Catania, and growing...
- Next meeting: August 14 at FNAL
- Milestone workshop: Oct. 15-17 at BNL.

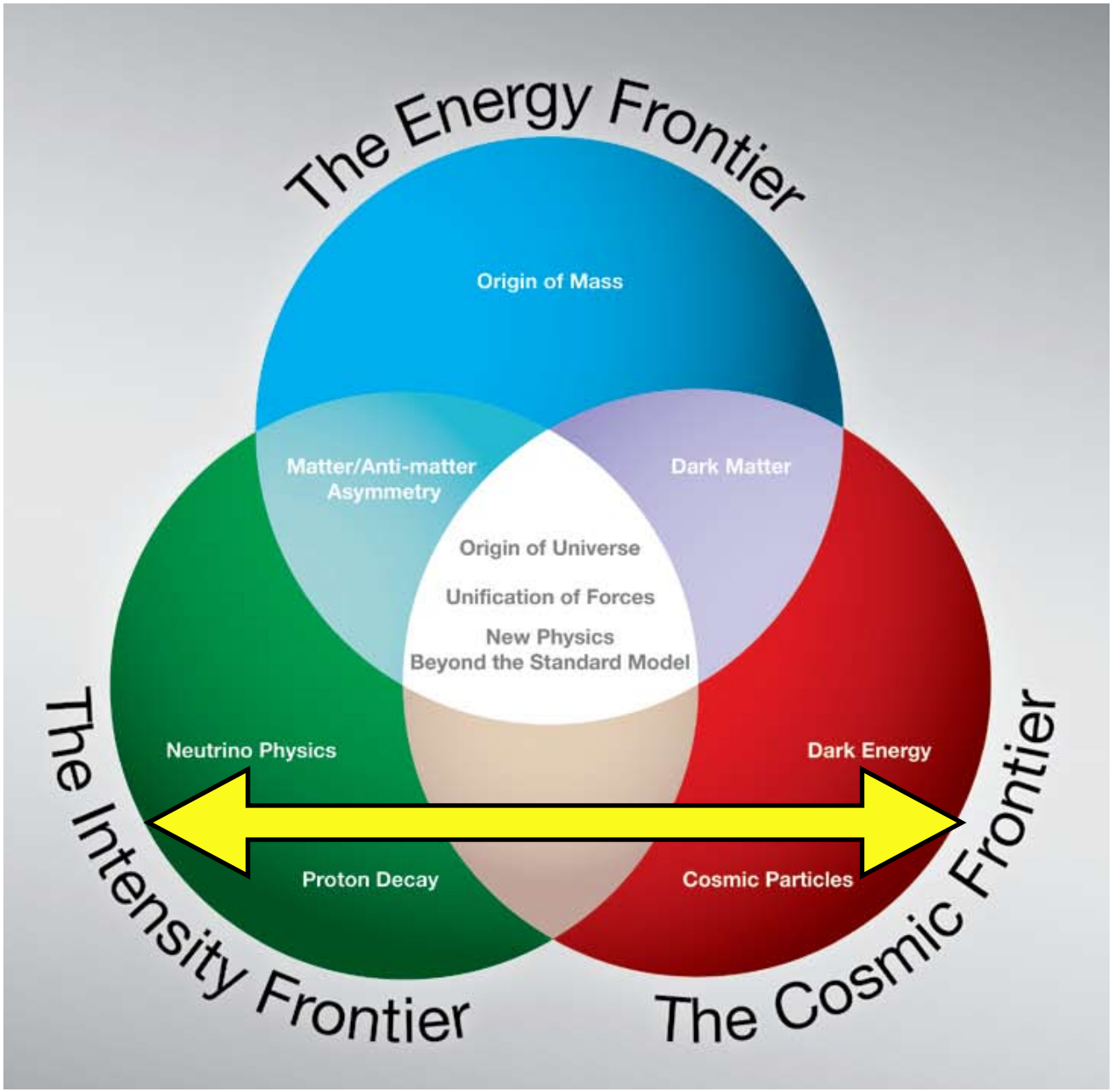
LB DUSEL Interim Organization





Combination of Eventual Detector Size: initial 100kTon (final >300kTon) , Depth (4850 ft), and distance (1300km from FNAL) makes project unique in world.

Science



From 2008 P5 report

Complementary to the physics of the energy frontier

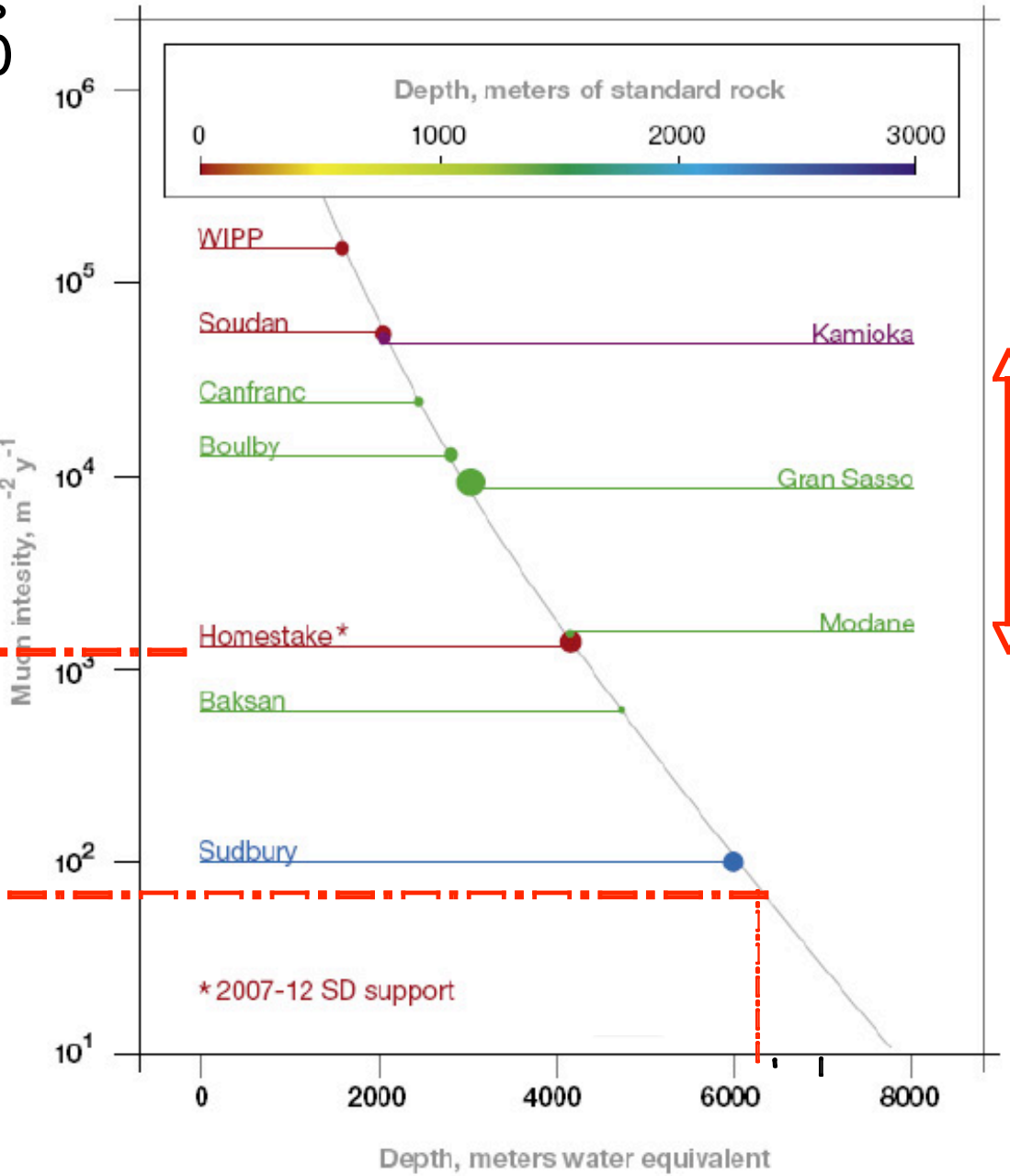
- Size, neutrino beam intensity, distance: the next step in neutrino physics.
- Size gives improved sensitivity to proton decay, our window to the unification of forces.
- Depth and low background allows detection of neutrinos from present and past supernova at cosmological distances.
- Very large increases to data from known natural neutrino sources: the Sun, and the atmosphere.

Depth

Depth will allow continuous data taking at low thresholds (<10 MeV) without deadtime and much lower background for low energy events such as some proton decay channels and cosmogenic neutrinos

4850' Campus

7400' Campus

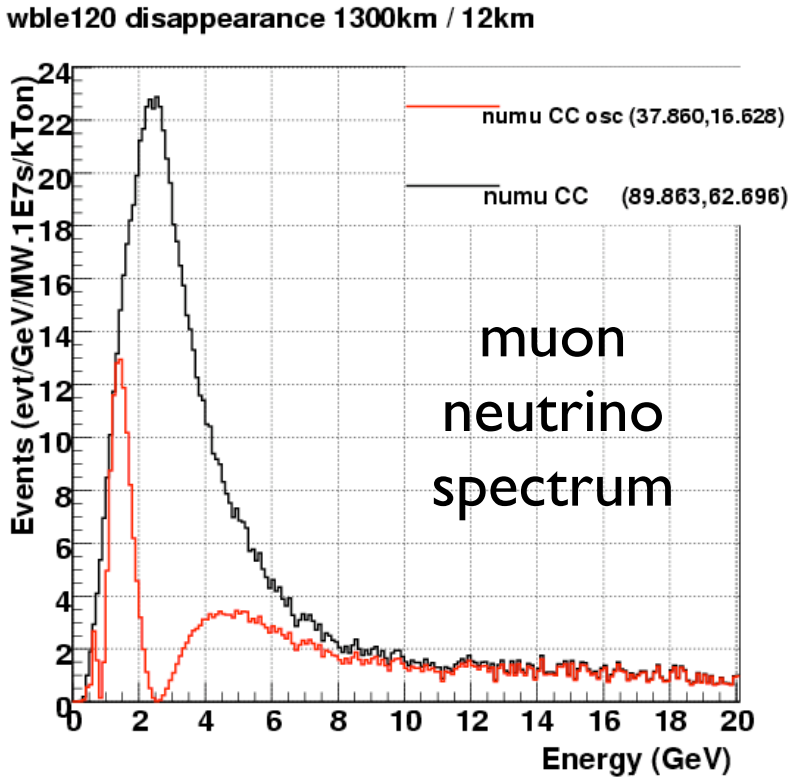


~factor of 100 less muon background than S-K

Physics with the Fermilab Neutrino beam

Evt rate: 1 MW for 3 yrs

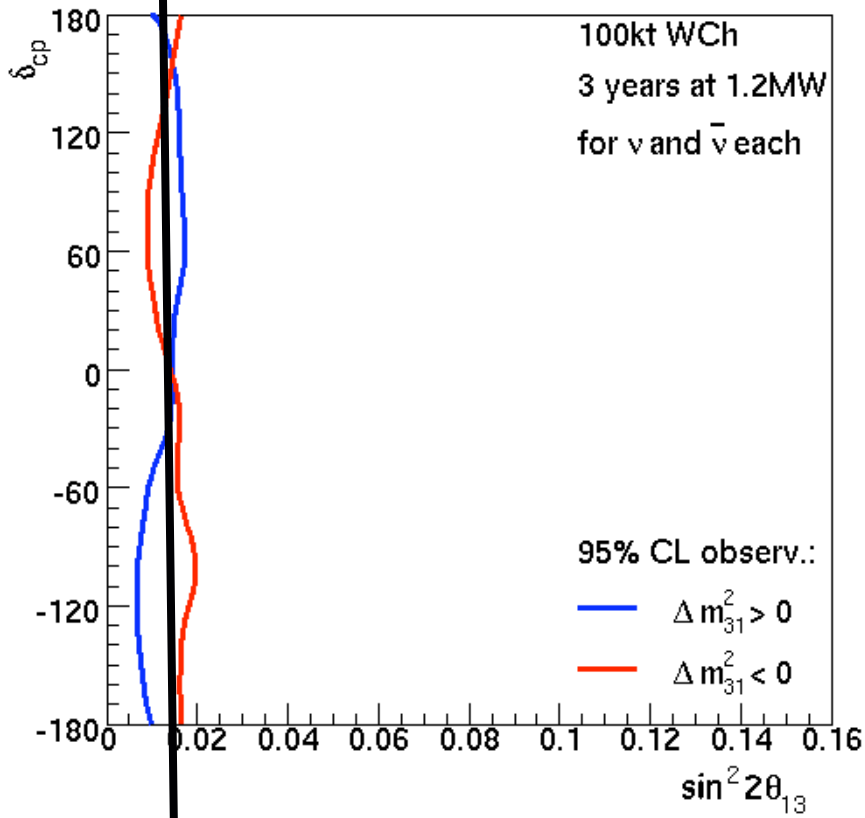
Event type	100kT, 120 GeV 0.5 deg.
No osc	53940
With osc	22740

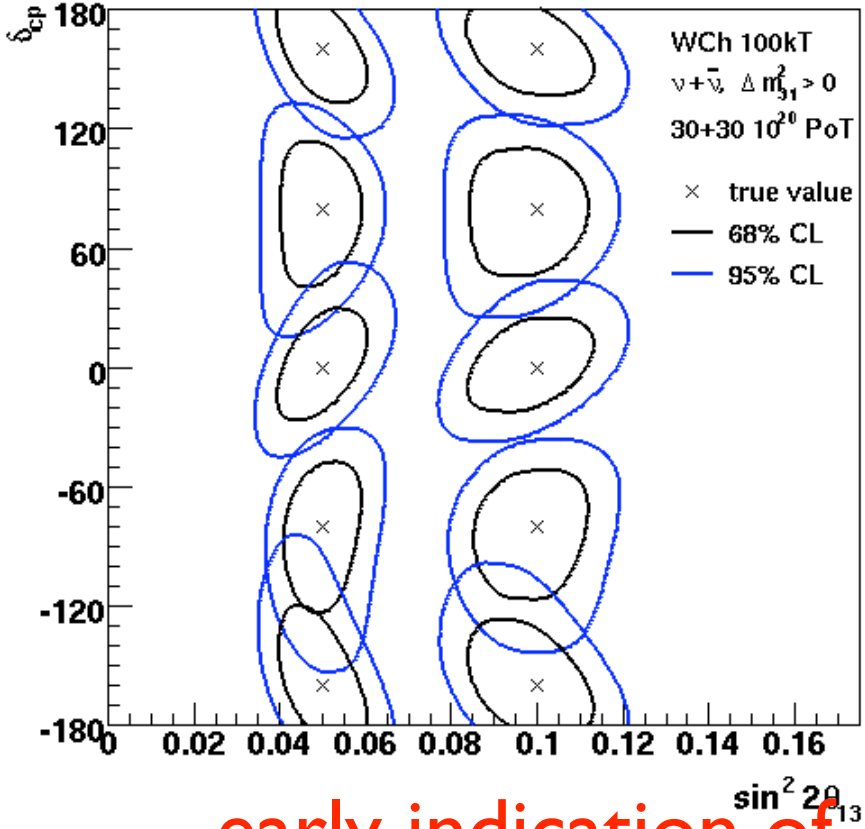


- Statistics factor of X10 larger than any other planned experiment in the world. Needs a new intense Fermilab neutrino beam.
- Oscillatory signature allows great precision and posibility of detecting new physics.
- A fraction of the disappeared events could "appear" as electron type events in the detector. Asymmetries in these electron type events are of fundamental interest. They determine ordering of neutrino masses, and possible CP violation in neutrinos.

Sensitivity plots for mass ordering and CP violation determination.

Homestake 100kT fiducial detector





0.015

early indication of CP violation with no ambiguities

Timescale, cost, and impact on US science.

- Cost range has been determined to be $150M to $250M for the first module 100 kTon detector. Two large factors are: excavation and photosensors.
- Detector can be built in 5-6 yrs, after construction start.
- Characteristics of a deep large cavity in hard rock is of fundamental interest to the geo-technical community.
- The project will lead to a very intense neutrino beam supplied by an upgraded accelerator complex with many new technologies. Timescale for the beam and upgrades is ~10 yrs.